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## CLAIMS

1. A polymer foam obtained by highly concentrated internal phase emulsion polymerization,  
5 which is formed from a crosslinked, exclusively hydrocarbon, polymer based on styrenic monomers, and has a density of 40 mg/cm<sup>3</sup> to 260 mg/cm<sup>3</sup> and cells with a mean diameter of 10 micrometers or less.
  
- 10 2. The polymer foam as claimed in claim 1, in which the polymer is a styrene/divinylbenzene copolymer.
  
- 15 3. The polymer foam as claimed in claim 2, in which the styrene/divinylbenzene weight ratio is between 5 and 1.
  
- 20 4. The polymer foam as claimed in any one of the preceding claims, which has a mean cell diameter of between 1 and 5 micrometers.
  
- 25 5. The polymer foam as claimed in any one of the preceding claims, in which the elements other than the constituent carbon and the constituent hydrogen of the polymer represent less than 3% by weight of the weight of the foam.

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International Preliminary Examination Report

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10. The process as claimed in any one of  
claims 6 to 9, in which the surfactant is diglyceryl  
30 monooleate.

English translation of the amended sheets of the  
International Preliminary Examination Report

11. The process as claimed in any one of claims 6 to 10, in which the surfactant represents from 13 to 20% by weight of the weight of the organic phase.

5 12. The process as claimed in any one of claims 6 to 11, in which the electrolyte is aluminum sulfate.

10 13. The process as claimed in any one of claims 6 to 12, in which the electrolyte represents from 0.05 to 2% by weight of the weight of the aqueous phase.

15 14. The process as claimed in any one of claims 6 to 13, in which the polymerization initiator is sodium persulfate.

20 15. The process as claimed in any one of claims 6 to 14, in which the polymerization initiator represents from 0.1 to 2% by weight of the weight of the aqueous phase.

25 16. The process as claimed in any one of claims 6 to 15, in which the water used for preparing the aqueous phase is water having a resistivity of about 18.2 megaohms.

30 17. The process as claimed in any one of claims 6 to 16, in which step b) is carried out by injecting the emulsion into a container by means of a

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International Preliminary Examination Report

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syringe connected to a pulser capable of delivering a pressure above atmospheric pressure.

18. The process as claimed in claim 17, in  
5 which the container is a mold having the shape and the dimensions of the foam that has to be manufactured.

19. The process as claimed in claim 17 or  
claim 18, in which the syringe is provided with a  
10 needle having an internal diameter of 150  $\mu\text{m}$  to 1 mm.

20. The process as claimed in any one of claims 6 to 19, in which the polymerization of the monomers is carried out at a temperature of around 30  
15 to 70°C.

21. The process as claimed in any one of claims 6 to 20, in which the washing of the foam comprises one or more operations of immersing this foam  
20 in water, followed by one or more operations of immersing it in an alcohol, which are themselves followed by one or more alcohol extraction operations.

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